

XXVI. "On Volta's Experiment of the Electricity produced by the contact and separation of different Metals." By WARREN DE LA RUE, M.A., D.C.L., F.R.S., and HUGO W. MÜLLER, Ph.D., F.R.S. Received June 7, 1876.

A short time since Prof. Tyndall asked one of us to lend him our Thomson-Becker quadrant electrometer for a lecture illustration of the electricity developed by metallic contact; as the bifilar electrometer in question had been purposely rendered much less sensitive than usual by the wide separation of the suspension-threads, it was thought advisable to test the instrument before sending it. This was done with a disk of copper and a plate of zinc, each fastened to a stick of sealing-wax; the action even with this rough appliance was so great that it seemed desirable to pursue the experiment further.

With this object we had constructed a simple piece of mechanism by Messrs. Elliott Brothers, which enables us to bring together and to separate two disks, one of copper and the other of zinc, each 6 inches in diameter, 400 times in a minute, and after each separation to make the zinc plate touch a spring attached to an insulated conductor; moreover, by means of cams, to make earth-connexion with either disk, or with both, previous to their being brought again into contact.

20 cells of a rod of chloride-of-silver battery charged up on May 27 (part of the 8040 cells now in work) and in perfect action were connected with the quadrant electrometer, so that the silver pole was in metallic contact with the quadrants to be charged, while the zinc pole and the other two quadrants were connected to earth. The deflection (say to the left), three times repeated, was each time 95 divisions of the scale.

When the contact-apparatus was now substituted for the battery, and the insulated conductor of the zinc disk was connected with the same quadrant of the electrometer with which the silver pole of the battery had been connected, and the apparatus worked steadily so as to make 320 makes and breaks of contact in a minute, then to make earth-connexion with the copper disk after each separation of the plates and during the time that the zinc was in metallic connexion with the electrometer, the deviation was to the left as before, and amounted to

	150 divisions of the scale.	
150	"	"
145	"	"
145	"	"
140	"	"
150	"	"
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Mean	146·7	"

so that the tension of the electricity as compared with a chloride-of-silver cell is as

$$\frac{146.7 \times 20}{95} = 30.88 \text{ to } 1.$$

The copper disk, after its separation from the zinc, acts as a condenser to the latter; and as soon as the copper disk is connected automatically with earth the bound electricity of the zinc is set free, and the needle of the electrometer makes a sudden jump. To observe this effect it is necessary to work the apparatus slowly.

When earth-connexion was made with the copper disk, and also subsequently with the zinc disk after the charge had been given off from it, and before a new contact, no sensible difference was observed in the deflection of the electrometer.

With an ordinary Elliott tangent-galvanometer, and indeed with one twice as sensitive as those generally made, not the slightest deflection of the needle was manifested; with, however, a Thomson galvanometer a deviation of the needle was obtained of 35 divisions in one direction and 35 divisions in the other, according as the zinc conductor was connected with one or other end of the galvanometer and the other end with earth.

The current, though feeble, is quite manifest nevertheless. To form a rough notion of the electromotive force, a piece of copper wire 0.5 inch long and 0.03 inch diameter was connected with one end of the galvanometer, and a piece of zinc 0.25 inch diameter and 0.5 inch long with the other, and the one held between the right-hand finger and thumb, and the other between the left-hand finger and thumb, using $\frac{1}{99}$ shunt in the galvanometer or only $\frac{1}{100}$ part of the current; this produced a deviation in the scale of 50 divisions with dry fingers, and 150 divisions when the fingers and thumbs were moistened; so that the quantity of electricity developed by the contact of dissimilar metals is consequently extremely small when the area (28.27 inches) of each disk is taken into account.

XXVII. "Note on the Mycelium described in my Paper on Smallpox of Sheep." By Dr. E. KLEIN, F.R.S. Received June 7, 1876.

In the above paper, which was printed in the Philosophical Transactions (vol. 165. pt. 1), I described and figured, in Section iv. part c, the presence, in the lymphatics of the skin of the pock, of what I regarded to be the mycelium of a fungus which I termed *Oidium variolæ* (see figs. 9, 10, and 11 of that paper). Similar features were described and figured in the cavities of the primary and secondary pustules.

My attention has been drawn by Dr. Charles Creighton to appearances, in many respects similar to those described by myself, which he found in